

WHAT IS CLAIMED IS:

1. An electromagnetic waveform comprising a computer program, the computer program for solving constraints during functional verification of a representation of an electronic design of an integrated circuit (IC), the computer
5 program comprising the following steps when executed by a data processing system:
 - selecting a first set of block-related constraints, from a first set of constraints, according to a first block;
 - identifying a first set of non-block-related constraints, from the first set of constraints, not selected for the first set of block-related constraints;
 - 10 conjoining the first set of block-related constraints to produce a first solution generator;
 - existentially quantifying the first block from the first solution generator to produce a first new constraint;
 - unioning the first new constraint and the first set of non-block-related constraints
15 to produce a second set of constraints;
 - selecting a second set of block-related constraints, from the second set of constraints, according to a second block;
 - conjoining the second set of block-related constraints to produce a second solution generator;
 - 20 solving the second solution generator; and
 - solving the first solution generator using a second result of solving the second solution generator.
2. A method for solving constraints, comprising:
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 - selecting a first set of block-related constraints, from a first set of constraints, according to a first block;
 - conjoining the first set of block-related constraints to produce a first solution generator;
 - existentially quantifying the first block from the first solution generator to produce
30 a first new constraint;

identifying a first set of non-block-related constraints, from the first set of constraints, not selected for the first set of block-related constraints;

unioning the first new constraint and the first set of non-block-related constraints to produce a second set of constraints;

5 selecting a second set of block-related constraints, from the second set of constraints, according to a second block;

conjoining the second set of block-related constraints to produce a second solution generator;

solving the second solution generator; and

10 solving the first solution generator using a second result of solving the second solution generator.

3. The method of claim 2, further comprising:

15 defining a partition, including the first block, prior to selecting a first set of block-related constraints.

4. The method of claim 2, further comprising:

20 defining a partition, including the second block, dynamically by applying a metric to the second set of constraints.

5. The method of claim 2, further comprising:

25 introducing at least one auxiliary variable, prior to the step of selecting a first set of block-related constraints, in order to reduce a complexity of at least one constraint contained in the first set of constraints.

6. The method of claim 2, wherein the first block does not contain state variables.

7. The method of claim 2, further comprising:

30 successively repeating the steps of existentially quantifying, identifying and unioning on a current set of constraints to produce a next set of constraints, and

selecting and conjoining on the next set of constraints according to a next block, until there is no next block.

8. The method of claim 2, further comprising:

5 existentially quantifying the second block from the second solution generator to produce a second new constraint; and

 successively repeating the steps of identifying and unioning on a current set of constraints to produce a next set of constraints, and selecting, conjoining and existentially quantifying on the next set of constraints according to a next block, until
10 there is no next block.

9. A computer program product comprising:

 a computer usable medium having computer readable code embodied therein for determining a solution to a set of constraints, the computer program product including:

15 computer readable program code devices configured to cause a computer to effect selecting a first set of block-related constraints, from a first set of constraints, according to a first block;

 computer readable program code devices configured to cause a computer to effect conjoining the first set of block-related constraints to produce a first solution
20 generator;

 computer readable program code devices configured to cause a computer to effect existentially quantifying the first block from the first solution generator to produce a first new constraint;

25 computer readable program code devices configured to cause a computer to effect identifying a first set of non-block-related constraints, from the first set of constraints, not selected for the first set of block-related constraints;

 computer readable program code devices configured to cause a computer to effect unioning the first new constraint and the first set of non-block-related constraints to produce a second set of constraints;

computer readable program code devices configured to cause a computer to effect selecting a second set of block-related constraints, from the second set of constraints, according to a second block;

5 computer readable program code devices configured to cause a computer to effect conjoining the second set of block-related constraints to produce a second solution generator;

computer readable program code devices configured to cause a computer to effect solving the second solution generator; and

10 computer readable program code devices configured to cause a computer to effect solving the first solution generator using a second result of solving the second solution generator.

10. An electromagnetic waveform comprising a computer program, the computer program for determining a solution to a set of constraints, the computer
15 program comprising the following steps when executed by a data processing system:

selecting a first set of block-related constraints, from a first set of constraints, according to a first block;

conjoining the first set of block-related constraints to produce a first solution generator;

20 existentially quantifying the first block from the first solution generator to produce a first new constraint;

identifying a first set of non-block-related constraints, from the first set of constraints, not selected for the first set of block-related constraints;

25 unioning the first new constraint and the first set of non-block-related constraints to produce a second set of constraints;

selecting a second set of block-related constraints, from the second set of constraints, according to a second block;

conjoining the second set of block-related constraints to produce a second solution generator;

30 solving the second solution generator; and

solving the first solution generator using a second result of solving the second solution generator.

11. A method for image computation, comprising:

- 5 selecting a first set of block-related FSM-related representations, from a first set of FSM-related representations, according to a first block;
 conjoining the first set of block-related FSM-related representations to produce a first solution generator;
 saving the first solution generator for use in a path determination process;
10 existentially quantifying the first block from the first solution generator to produce a first new FSM-related representation;
 identifying a first set of non-block-related FSM-related representations, from the first set of FSM-related representations, not selected for the first set of block-related FSM-related representations; and
15 unioning the first new FSM-related representation and the first set of non-block-related FSM-related representations to produce a second set of FSM-related representations.

12. A computer program product comprising:

- 20 a computer usable medium having computer readable code embodied therein for image computation, the computer program product including:
 computer readable program code devices configured to cause a computer to effect selecting a first set of block-related FSM-related representations, from a first set of FSM-related representations, according to a first block;
25 computer readable program code devices configured to cause a computer to effect conjoining the first set of block-related FSM-related representations to produce a first solution generator;
 computer readable program code devices configured to cause a computer to effect saving the first solution generator for use in a path determination process;

computer readable program code devices configured to cause a computer to effect existentially quantifying the first block from the first solution generator to produce a first new FSM-related representation;

5 computer readable program code devices configured to cause a computer to effect identifying a first set of non-block-related FSM-related representations, from the first set of FSM-related representations, not selected for the first set of block-related FSM-related representations; and

10 computer readable program code devices configured to cause a computer to effect unioning the first new FSM-related representation and the first set of non-block-related FSM-related representations to produce a second set of FSM-related representations.

13. An electromagnetic waveform comprising a computer program, the computer program for image computation, the computer program comprising the
15 following steps when executed by a data processing system:

selecting a first set of block-related FSM-related representations, from a first set of FSM-related representations, according to a first block;

conjoining the first set of block-related FSM-related representations to produce a first solution generator;

20 saving the first solution generator for use in a path determination process;

existentially quantifying the first block from the first solution generator to produce a first new FSM-related representation;

25 identifying a first set of non-block-related FSM-related representations, from the first set of FSM-related representations, not selected for the first set of block-related FSM-related representations; and

unioning the first new FSM-related representation and the first set of non-block-related FSM-related representations to produce a second set of FSM-related representations.

30 14. A method for finding a path of states through an image computation, comprising:

obtaining a first set of solution generators saved from an image computation process;

applying the first set of solution generators to a first state to determine a second state, of a second set of states at one time-step to a time step of the first state, wherein
5 the first state is reachable from the second state.

15. The method of claim 14, wherein the first set of solution generators are also applied in order to determine a second combination of primary inputs, wherein the first state is reachable from the second state by applying the primary inputs.

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16. A computer program product comprising:

a computer usable medium having computer readable code embodied therein for finding a path of states through an image computation, the computer program product including:

15 computer readable program code devices configured to cause a computer to effect obtaining a first set of solution generators saved from an image computation process;

computer readable program code devices configured to cause a computer to effect applying the first set of solution generators to a first state to determine a second
20 state, of a second set of states at one time-step to a time step of the first state, wherein the first state is reachable from the second state.

17. An electromagnetic waveform comprising a computer program, the computer program for finding a path of states through an image computation, the
25 computer program comprising the following steps when executed by a data processing system:

obtaining a first set of solution generators saved from an image computation process;

applying the first set of solution generators to a first state to determine a second
30 state, of a second set of states at one time-step to a time step of the first state, wherein the first state is reachable from the second state.